THE EFFECT OF MACROECONOMIC INDICATORS ON STOCK MARKET: A STUDY ON ASIAN ECONOMIES

MANSOOR ALAM KHAN, RIAZ AHMAD, DR. MUHAMMAD AKRAM, HAFIZ MUHAMMAD ISHAQ**

i.   Assistant Manager Finance, Iftekhar Ahmed & Co. Karachi Pakistan. m.mansooralamkhan@gmail.com
ii. Faculty of business administration, Iqra University Karachi, Pakistan. riaz.ahmad@iqra.edu.pk
iii. Faculty of Business School, Bahria University, Islamabad, Pakistan. makram@bahria.edu.pk
iv. Assistant professor, Federal Urdu University of Arts, Science and Technology Islamabad, ishaqhafiz74@gmail.com

Abstract
The current study objective is to investigate the effect of four macroeconomic indicators namely gold price, crude oil price, rate of foreign exchange and inflation on the Asian stock markets. For this objective, the yearly panel data of the ten Asian economies from year 2007 to 2020 was collected. The random effect model analysis led to the conclusion that the price of gold has a positive and significant effect on the stock market whereas the price of crude oil and inflation have a negative and significant effect on the stock markets of Asian countries. Furthermore, the relationship of exchange rate along with Asian stock markets was found positive but insignificant. This study is considered quite beneficial for prediction of stock market performance. Hence, both policy makers and investors can benefit from the findings. For researchers and students, the extended framework of this research contributes immensely towards the existing literature on the subject.
Keywords: *Stock Market, Foreign Exchange, Gold Price, Inflation, Crude Oil*

Introduction
It is well accepted and known that stock markets are critical to a country's growth (Najaf, 2016). They are thought to be the best way to represent a country's economic situation (Najaf, 2016). The function of stock market is not limited to the extent of trading securities only (Aduda et al., 2012). They act as a bridge of facilities among the users and savers of the capital by transferring wealth, pooling funds and sharing the risk (Aduda et al., 2012). Moreover stock market facilitate growth of the economy by promoting resources flow to opportunities of investments (Aduda et al., 2012). In scenarios of active stock markets predications regarding future of economic growth are significantly facilitated (Levine & Zervos, 1999; Singh, 1997).

Moreover, with the significance of the stock market, from theoretical perspective, arbitrage pricing theory (APT) proposed by Stephen Ross (Ross, 2013), suggests that macroeconomic factors can influence the performance of stock markets (Ajaz et al., 2017; Chang et al., 2019). The theory suggests that asset returns can be forecasted with the assistance of linear association among asset returns and macroeconomic factors that are having systematic risk

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(Lehmann & Modest, 1988). Among these macroeconomic indicators, gold price is also one of major indicator of development of economy (Baur & McDermott, 2010) and it is considered as much safe investment (Shabbir et al., 2020). The oil price also have significance in this regard because it is one of the prime sources of energy for many production process (Shahrestani & Rafei, 2020). Similarly, an exchange rate can have a greater influence on the economic progress through trading (Bashir et al., 2016). In a similar way, inflation is also a very important factor both for the developed and the developing countries. The prime objective of macroeconomic policies in both the cases is to keep the inflation low together with sustainability in economic growth (Krugman, 1995).

Empirically, the results of past studies conducted on the four macroeconomic indicators; gold price, crude oil price, rate of foreign exchange and inflation have shown mixed findings (Abbas & Wang, 2020; Ajaz et al., 2017; Al-hajj et al., 2018; Chang et al., 2019; Ho & Odhiambo, 2019; Mukherjee & Naka, 1995; Öhman & Yazdanfar, 2017; Tursoy & Faisal, 2018). Most of the studies have focused on developed economies and there is limited literature available that focuses on developing economies (Chang et al., 2019; Mohapatra, 2019). Especially, on Asian economies most of the studies are country-specific, for instance, Pakistan (Shabbir et al., 2020), Malaysia & Turkey (Najaf, 2016), India (Jayashankar & Rath, 2017), China (Chen & Wang, 2017). Therefore, to the best of author's knowledge, there is a lack of focused studies on major Asian economies holistically.

In addition to the above discussion, the performance of stock market of ten Asian countries namely Pakistan, India, Malaysia, Thailand, Indonesia, Singapore, Philippine, Srilanka, Vietnam and Kazakhstan is continuously declining from 2015 to 2019. Taking 2014 as base year, the percentage increase of the average stock index of these ten Asian economies was 107.32 percent in 2015, 103.62 percent in 2016, 118.48 percent in 2017, 95.75 percent in 2018 and 91.02 percent in 2019 (Fusion Media Limited, 2021a). On the other side when stock market performance is decreasing the crude oil price is increasing. In 2015, the percentage increase was 55.73 percent, 77.77 percent in 2016, 96.72 percent in 2017, 160.35 percent in 2018 and 84.19 percent in 2019 (Index Mundi, 2021a). Also, Najaf (2016) found a negative interrelation between the price of the oil and the stock exchange. In the same scenario, when stock market performance was decreasing, the gold price was also increasing (Index Mundi, 2021b). In 2015 the percentage increase in gold price was 92.37, 108.03 in 2016, 98.74 in 2017, 101.69 in 2018 and 106.04 in 2019. Later, Tursoy & Faisal (2018) also found a negative connection among the gold price and the stock market.

Similarly, identical behaviour was observed in the rate of foreign exchange; when stock market performance was declining, the movement of the foreign exchange (US Dollar to Local currency) was increasing. In 2015, the average of foreign exchange rates of above mentioned Asian countries were 3557.72, 3596.34 in 2016, 3650.34 in 2017, 3778.89 in 2018 and 3798.97 in 2019 (Fusion Media Limited, 2021b). This negative connection among the rate of exchange and the stock market performance was also observed by Nordin et al. (2020) . Similarly, the average inflation of these Asian countries in 2015 was 2.42, 3.59, in 2016, 3.68, in 2017, 3.24 , in 2018 and 3.69 in 2019 (The World Bank Group, 2021). The negative interrelation among the inflation and the stock market is also observed by (Jareño Cebrián & Navarro, 2016).

As mentioned above there is declining trend in performance of Asian stock market however at the same time there is an inclining trend in price of gold, crude oil price, the rate of foreign exchange and inflation. Therefore, a question arises on the nature of their interrelationship. The same has been investigated in the current study. Along with this practical problem, there is limited literature available that focuses on Asian economies (Elam, 2020;Habiba et al., 2020; Katoch, 2018). Furthermore the findings of available literature on the relationship among macroeconomic factors and stock market performance have shown inconsistency in

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their results (Abbas & Wang, 2020; Kim & Shamsuddin, 2008). Additionally, to the best of author's understanding and knowledge, the impact/ influence of crude oil, gold price, foreign exchange and inflation (as independent variables) on stock market performance (as the dependent variable) have not been studied so far on economies of Asian countries. This constitutes the gap for the current study.

Research Objective

Based on the aforementioned discussion, the research objective set for the current study is mainly to investigate the nature of relationship among the macroeconomic indicators and the performance of Asian stock markets.

Literature Review

The ensuing paragraphs present the available literature on the subject variables both from theoretical and empirical perspective:

Theoretical Background

Arbitrage Pricing Theory (APT) supports the conceptual framework and model of this study. Arbitrage pricing theory suggests that there are multiple factors, including macroeconomic variables, which affect stock prices. (Ajaz et al., 2017). Chang et al. (2019), has also applied APT on their study on connections among the macroeconomic indicators and the stock market. Nijam et al. (2015), has also favoured this theory for the explanation of relation of stock market performance and the macroeconomic variables. The macroeconomic variables (Gold Price, Crude Oil Price, the rate of Foreign Exchange and Inflation) are employed as independent variables and stock market is employed as dependent variable. APT fundamentally works on an assumption that asset returns can be forecasted with the assistance of linear association among asset returns and macroeconomic factors that are having systematic risk (Lehmann & Modest, 1988). Therefore, on the basis of explanation of the relationship among variables used and due to support of past studies APT is selected for this study.

Stock Market

Any stock market is widely popular as one of the most important part of its home country economy's financial sector (Aduda et al., 2012). They are the best way to represent a country's economic situation (Najaf, 2016). Due to presence of the stock markets, organization's shares can be allotted and circulated by potential investors easily (Najaf, 2016). Thus they make smooth way for investments through high yielding facilities and can enhance the allocation of capital by allowing the execution of long term projects (Ho & Odhiambo, 2019). Stock markets also provides a market liquidity factor that enables investors to manage risk and allowing companies to approach capital easily (Ho & Odhiambo, 2019). Along with trading securities, stock markets acts as a bridge of facilities among the users and savers of the capital by transferring wealth, pooling funds and sharing the risk (Aduda et al., 2012). Moreover stock market facilitate growth of the economy by promoting resources flow to opportunities of investments (Aduda et al., 2012). These investments are more productive in short credit in the economy and are smartly allocated through stock markets (Aduda et al., 2012). In scenarios of active stock markets predications regarding future of economic growth, these are significantly facilitated by stock markets (Levine & Zervos, 1999; Singh, 1997).

Oil Price

Oil is important because it is one of the most crucial sources of obtaining energy in a number of production processes but its price along with levels of production highly fluctuates (Shahrestani & Rafei, 2020). Policymakers, practitioners and academics considers oil price fluctuation responsible for affecting multiple forces for example supply distributions, global demand, and related precautionary plans (Caldara et al., 2019). Although the subject related to significance of these forces is debated highly (Caldara et al, 2019). Any sort of increase and decrease in price of oil brings unavoidable changes in the stock market returns (Al-hajj et

al., 2018). Therefore, over the years the increase and decrease of oil price has got a great deal of attention from scholars (Al-hajj et al., 2018).

Gold Price

Gold is one of the early shapes on currency (Baur & Lucey, 2010). Being one of the most the expensive metals gold is used in many forms (Samontaray & Alanuzi, 2015). Including personal use, gold as jewellery gold is used internationally when different central banks of the world present gold as an asset in their balance sheet (Samontaray & Alanuzi, 2015). Investors have discovered noteworthy benefits in gold investments (Shabbir et al., 2020). Gold was used as inflation hedge traditionally (Baur & Lucey, 2010). It is considered as much reliable investment according to different investors (Shabbir et al., 2020). One of the important aspect of the gold in an era of modernity is that it presumed to be non-connected with other types of traded assets (Baur & Lucey, 2010). With reference to health of economy gold price is well known as prime indicator (Baur & McDermott, 2010). Development of economy is influenced by Gold Price globally (Baur & McDermott, 2010).

The Rate of Foreign Exchange

A competitive exchange rate can lead to an improvement in the economy position effectively in trade context (Bashir et al., 2016). In such situation the profitability of firms and equity will increase which can boost the economy of a country (Bashir et al., 2016).When domestic currency of a country depreciates it can make local products price competitive in international trade market which results in excessive increase in volume of exports (Mukherjee & Naka, 1995). Opposite to that, decrease in local currency of a country can increase production cost for those firms who are dependent on imported inputs for their production (Bashir et al., 2016). Ultimately, there would be a fall in profits, value of the firm and prices of the shares as well (Bashir et al., 2016; Mukherjee & Naka, 1995). In case of increase in exchange rates foreign portfolio investment also inclines which results as boost in the local economy (Rahman and Uddin, 2009).

Inflation

There is no absolutely no disagreement that inflation is also considered as significant one along with other important macroeconomic indicators with its relationship to the stock markets (Gupta & Inglesi-Lotz, 2012). No matter the country is developed or developing, in both cases, to keep the inflation low together with sustainability in economic growth is one of the prime objective of macroeconomic policies (Krugman, 1995). Most economists, policy makers, practitioners have a consensus on this idea because smooth function of market economy have an influence due to high levels of Inflation (Krugman, 1995). On the other hand, there is insufficient consensus in account of relationship between economic performance and inflation, and the system which influence the economic activity on the micro level (Chimobi, 2010). An inflation uncertainty is caused due to an increase in inflation in such situation more risk premium is demanded by investors on their investments which decreases the Stock Price (Malkiel, 1979). Therefore, the protection price connected to unforeseeable inflation have grabbed researcher's attention on the relationship of inflation and its unpredictability (Payne, 2008).

Hypothesis Development

Oil Price and Stock Market

Najaf (2016) conducted a research to investigate the link among the stock exchange of the Malaysia and Turkey along with oil prices by applying correlation analysis. They collected data of the fifteen years and findings showed a negative connection between stock exchange and oil prices. In another study by (Phan et al., 2015) to test a nonlinear relationships in between firm returns and oil price by applying Generalised Autoregressive Conditional Heteroskedasticity (GARCH) regression model on data from 20 different top firm of USA results showed an inconsistent outcome because of variation of equity returns among the

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sectors with regard to negative and positive change in oil prices. On the other side (Raza et al., 2016) researched on relation in between the price of oil and the stock market and used nonlinear ARDL to test over few developing markets, along with Malaysia. There results indicated negative relationship between the price of oil and the stock market returns. Hatemi-J et al. (2017) conducted a study to investigate the casual impact of oil prices on stock market by applying the test of Granger causality on weekly data from the tenure of January 1975 to October 2013 and results showed the positive relation between the price of oil and United States and Japanese stock market performance. In the study of (Roubaud & Arouri, 2018) the investigation of relation between Oil price and US stock market was performed by applying linear VAR models and linear VAR models on data which was monthly from 1975 to 2015 there findings revealed a nonlinear and significant relationship. Recently (Shabbir et al., 2020) applied augmented Dickey–Fuller test, correlation and autoregressive distributed lag test on data from 1991–2016 to test the price of oil impact on the stock market and found that the price of oil have a significant and a positive effect on stock market.

H1: There is a significant relationship between the crude oil price and Asian stock markets.

Gold Price and Stock Market

Samontaray and Alanuzi (2015) conducted a research study to find out about the relationship of the gold price and the stock market by applying OLS (Ordinary least square) of monthly data from Saudi Arab's stock exchange of ten years from October 2014 to November 2013. The findings revealed that stock market respond negatively to price movement of gold. Similarly, Tursoy & Faisal, (2018), in an investigation about the connection between the gold price and the stock market for which autoregressive distributed lag (ARDL) model was employed on turkey data from the tenure of January 1986 to November 2016 ,found that gold price was having a negative interrelation with the stock price in both of periods i.e. short run and long run. However (Chen & Wang, 2017) explored the relationship among the gold price and the stock market by applying DCC-GARCH model on daily data from multiple sections of China stock market and found both positive and negative conditional correlation on their selected period of study. Singhal et al. (2019) in their study to investigate about the dynamic linkage among the gold price and the stock market through using ARDL Bound testing co-integration on data from January 2006 to April 2018 found that the influence of the gold price on the stock market is positive. Shabbir et al. (2020) applied correlation, augmented Dickey–Fuller test, and autoregressive distributed lag test on data over the tenure of 1991–2016 to test the gold prices changes effects on stock market and found the gold price is having a positive and a significant influence on the stock market. Nordin et al. (2020) in their study for the testing the relation of rate of interest, commodity price and exchange rate on the stock market in Malaysia for which they had employed bound test approach on monthly data from 1997 to 2012. The result of their study did not provide significant effect of changes of gold price on the stock market. Based on previous discussion, it is hypothesized that,

H2: There is a significant relationship between the gold price and Asian stock markets.

The Rate of Foreign Exchange and the Stock Market

Nijam et al. (2015) investigated the link between macroeconomic factors and the stock market in Srilankan context. They applied Ordinary Least Square (OLS) linear, linear- log, log- log and log- linear data transformation on data from 1980 to 2012. There result showed significant positive relation of exchange rate with stock market. Bashir et al. (2016) also performed a research to explore the correlation in between the rate of exchange and the stock market over the region of Latin America. For which they employed Granger causality and detrended cross-correlation approach on monthly data from 1991 to 2015. The results showed positive correlation in Brazil and Argentina for longer period however in remaining countries the relation was negative for short period which moved to positive later on. Jayashankar and

Rath (2017) in their study which was conducted to observe the interrelation in between the rate of foreign exchange and the stock return and interest rate in Indian stock market have applied (MODWT) maximum overlap discrete wavelet transform technique on monthly based data acquitted for the tenure of January 2000 to December 2014 and found a clear link on high scales however on lower scales the connection in between the rate of foreign exchange and stock return was insignificant.Naresh et al. (2018) performed a study to analyse the spill over effects between the rates of exchange and the stock indices using (GMM) generalized methods of moments on ten years daily data of Brazil, Russia, India, China, and South Africa from 1st January 2006 to 23rd December 2015. The finding of their study revealed the positive relation in among the rate of foreign exchange and the stock indices those countries.Chang et al. (2019) in their investigation to examine the interrelation among macroeconomic indicator with the stock price used autoregressive distributed lag model on Quarterly based data taken from Pakistan stock exchange. There findings showed that exchange rate have negatively affected the Stock Price.Nordin et al. (2020) have researched for the testing the relation of rate of interest, commodity price and rate of foreign exchange overstock market of Malaysia. For this purpose, they had employed approach of bound test on monthly based data from 1997 to 2012. The result of their study provided significant negative relationship between exchange rate and stock market performance. Based on previous discussion, it is hypothesized that,

H3: There is a significant relationship between the rate of foreign exchange and Asian stock markets.

Inflation and Stock Market

Nijam et al. (2015) investigated the influence on the stock market of macroeconomic factors in Srilankan context. For the said purpose, they used Ordinary Least Square (OLS) linear, linear- log, log- log and log- linear data transformation on data from 1980 to 2012. Their results showed significant negative relation of Inflation with stock market. Jareño Cebrián and Navarro (2016) studied to test the effects of European inflation on the stock market of Spain. For this study, they employed the Ordinary Least Square (OLS) Estimation on data from 1995 to 2004. On the basis of the results they concluded that there was a negative effect of the Inflation on the Stock returns. Antonakakis et al. (2017) studied to test correlation among the inflation and the stock price in United States of America. They have applied dynamic conditional correlation (DCC)-GARCH model. There data was on annual basis from 1791 to 2015. The results indicated that the correlation between Inflation and Stock Market of United States of America was significantly positive in 1840(s), 1860(s), 1930(s) and 2011. For the remaining period it was significant negative. Chang et al. (2019) conducted a study to examine the relationship of macroeconomic variables with stock price. They used an autoregressive distributed lag model on quarterly based data acquired from Pakistan stock exchange. There finding showed that Inflation have positively affected the Stock Price. Recently, (Norehan & Ridzuan, 2020) in their study for examination of effects on stock market of macroeconomic variables for which they had applied Augmented Dickey-Fuller and Phillips-Perron tests on yearly based data from 1981 to 2017. They found a significant and a positive relation among the Inflation and the Stock market. Based on previous discussion, it is hypothesized that,

H4: There is a significant relationship between the inflation and Asian stock markets.

Conceptual Frame work

The previous discussion had become the foundation for the development of research framework. The current research framework is consisted of four independent variables namely, crude oil prices, gold prices, the rate of foreign exchange, inflation and stock market performance is a dependent variable. All of these variables are predicted in following Figure.1 below.

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┌─────────────────────────┐
│   Crude Oil Prices      │─────────────┐
└─────────────────────────┘              │
                                          ▼
┌─────────────────────────┐      ┌──────────────────┐
│   Gold Prices           │─────▶│  Stock Market    │
└─────────────────────────┘      │  Performance     │
                                 └──────────────────┘
┌─────────────────────────┐        ▲
│   The rate of Foreign   │────────┘
│   Exchange              │
└─────────────────────────┘
┌─────────────────────────┐
│   Inflation             │
└─────────────────────────┘
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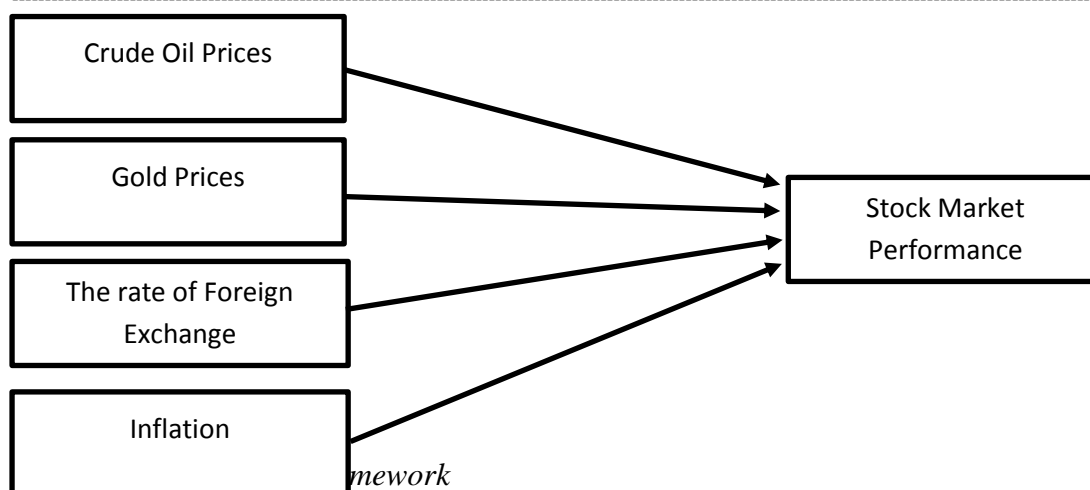
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Research Methodology

A specific process adopted to conduct a research study is called research design which covers the whole framework of the study from methodology of research to the analysis of data (Flick, 2014). Usually, two research approaches are used to conduct any study: inductive approach and deductive approach (Sekaran & Bougie, 2016). In inductive approach new theories are developed with movement from specific to general (Bryman, 2011). In inductive approach some hypothesis are developed to test the existing theories (Wiles et al., 2011). In the current study, deductive approach was adopted to observe and examine the existing theories which will be empirically justified. Additionally, research questions and research objectives are also addressed via hypothesis testing. The data for testing hypothesis was completely quantitative. This study was conducted through secondary quantitative data which was on yearly basis on data from 2007 to 2020 obtained from online sources like data.worldbank.org, www.investing.com, www.psx.com.pk etc. The nature of the data was panel data. Stock markets are population of current study. The price of stock index and price for crude oil, gold price, the rate of foreign exchange and inflation rate are taken to collect the yearly data of ten Asian economies namely Pakistan, India, Malaysia, Thailand, Indonesia, Singapore, Philippine, Srilanka, Vietnam and Kazakhstan. The source of data was online database websites for e.g. data.worldbank.org, www.investing.com, www.psx.com.pk etc.

Measurement of the Variables

For the measurement of variables and their literature sources, Table 1 provides comprehensive details.

Table 1: Measurement of the Variables

Variable	Measurement	Sources
SM	Stock index prices are used as proxy for stock market	Antonakakis et al. (2017)
CP	Yearly Crude oil Price	Shabbir et al. (2020)
GP	Yearly Gold Price	Shabbir et al. (2020)
FX	Exchange rate of USD/Local Currency	Nijam et al. (2015)
IN	Yearly CPI	Antonakakis et al. (2017)

Note: Stock Market (SM), Crude Oil Price (CP), Gold Price (GP), The Rate of Foreign Exchange (FX), Inflation (IN)

Econometric Model of the Study

The data's nature for the present study is panel. As it is having both attributes of units of observations or entities (i) on a time period (t). As per pannel data assumption (unit of observation or entity and both will be >1) (Baltagi, 2008). The following econometric model

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is applied to describe the association among the stock market, crude oil price, gold price, the rate of foreign exchange and inflation.

$$\ln(SM_{it}) = \beta 0 + \beta 1 \ln(CP_{it}) + \beta 2 \ln(GP_{it}) + \beta 3 \ln(FX_{it}) + \beta 4 \ln(IN_{it}) + \mu_{it}$$

Data Analysis and Methods

To analyze data, the current study has used both types inferential and descriptive statistics. To study the nature of available data descriptive statistics helps in the form of measures like standard deviation, arithmetic mean, median, mode (Samuel et al., 2002). Therefore, in this research to describe the data and its trends the measures of descriptive statistics are applied. To deal with model specification, normality and multicollinearity, linearity regression diagnostics are employed (Zeng et al., 2016). The above-mentioned tests are very essential and helpful to define the data and explore its hidden aspects. Later on, to analyze the relationship among the variables panel regression models were used. STATA software was used to conduct all above mentioned analysis.

Data Analysis and Interpretation

Diagnostic Statistics

Autocorrelation and Heteroscedasticity

To check the autocorrelation problem, Wooldridge test is used (Bratamanggala, 2018). It is suggested that if the Chi-squared probability value is greater than 5%, then there will be no autocorrelation problem (Bratamanggala, 2018). The output results in Table 2 shows the probability value for model of this study less than 5 % which means there is a problem of autocorrelation. Therefore, robust test will be applied on appropriate model. To check the heteroscedasticity problem, the Breuch Pagan test is employed (Bratamanggala, 2018). For its result, it is suggested that if the Chi-squared probability value is grater then 5 %, then there will be no problem of heteroscedasticity (Bratamanggala, 2018). The results in Table 2 show the Chi-squared probability value more than 5 % which means there is no heteroscedasticity problem found.

Table 2: Autocorrelation and Heteroscedasticity

Autocorrelation	Heteroscedasticity
P-Value	P-Value
0.000	0.9657

Multicollinearity

Variance inflation factor (VIF) is used to investigate the presence of multicollinearity among independent or predictor variables (Daoud, 2017)**.** Preferably VIF value should be less than 3 for no multicollinearity among independent variables (Purwanto, 2021). The result in Table 3 exhibits the all variables's VIF values which is less than 3 which means there is no presence of multicollinearity among independent variables.

Table 3: Multicollinearity

Variable	VIF
Inflation	1.25
Foreign exchange	1.15
Crude Oil Price	1.14
Gold Price	1.03

Results and Discussion

Descriptive Statistics

Descriptive analysis of result of the variables are presented in Table 4 For stock market, Std. Dev is 0.6073684, Min is 2.33, Max is 4.67 and Mean is 3.369857. For gold price, Std. Dev is 0.1059443, Min is 2.816679, Max is 3.238603 and Mean is 3.086739. For crude oil price, Std. Dev is 0.1503037, Min is 1.601299, Max is 2.124015 and Mean is 1.874342. For exchange rate, Std. Dev is 1.256872, Min is 0.0891276, Max is 4.367356 and Mean is

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1.983092. For inflation, Std. Dev is 0.3859114, Min is -0.7254965, Max is 1.363902 and Mean is 0.6093285.

Table 4: Descriptive Statistics

Variable	Min	Max	Mean	Std. Dev.
Stock Market	2.33	4.67	3.369857	.6073684
Gold Price	2.816679	3.238603	3.086739	.1059443
Crude Oil Price	1.601299	2.124015	1.874342	.1503037
Exchange Rate	.0891276	4.367356	1.983092	1.256872
Inflation	-.7254965	1.363902	.6093285	.3859114

Correlation Analysis

The direction and strength of the association among the explanatory variables can be analyzed by correlation matrix (Ayako et al., 2015). The sign of correlation coefficient (r) tells the directions of association and its value tells its strength of the relationship which ranges from +1 to -1 (Ayako et al., 2015). Correlation matrix is presented in Table 6. The association level among the Gold price and the crude oil price is -0.1328 percent which indicates negative and weak relationship. This association is significant at 5 percent. The association among the gold price and exchange rate is 0.0561 which is negatively insignificant at 5 percent. The association among the gold price and inflation is -0.1160 which is weak and negative. The association among the crude oil price and rate of exchange is -0.0961 that is negatively insignificant at 5 percent. The association among the crude oil price and inflation is 0.2865 that is positive and weak. The association between exchange rate and inflation is 0.2973 which is positive and weak. These association are acceptable at 95 percent confidence interval.

Table 5: Correlation Analysis

	Gold Price	Crude Oil Price	Exchange Rate	Inflation
Gold Price	1.0000			
Crude Oil Price	-0.1328	1.0000		
Exchange Rate	0.0561	-0.0961	1.0000	
Inflation	-0.1160	0.2865	0.2973	1.0000

Regression Analysis

Breuch-Pagan Lagrange Multiplier Test

The Lagrange multiplier test is used for identification of suitable model among Pooled regression Model (PRM) and other options for the purpose of estimation for panel data (Hussain et al., 2020). Table 6 shows the output of Breuch Pagan Lagrange multiplier test. It helps in deciding suitable model between PRM, Random Effect model (REM) or Fixed effect model (FEM) model(Hussain et al., 2020) Null hypothesis means that for all entities the intercepts and the slopes are same. (Hussain et al., 2020). The value of chi-square has indicated that it has rejected null hypothesis of similar slopes and intercepts. This result indicates that REM or FEM model will be suitable estimates than PRM.

Table 6: Breuch-Pagan Lagrange Multiplier Test

Dependent Variable	chi-square
Stock Market	0.0000

Hausman Test

Hausman test is applied to pick best model among random effect mode and fixed effect model (Ayako et al., 2015). In hausman test null hypothesis (Ho) supports random effect model as better on the other hand alternate hypothesis (H1) supports fixed effect model as better (Ayako et al., 2015). Incase if its prob value will be greater than 0.05 then the REM

will be suitable however incase prob value will be less than 0.05 then FEM will be more suitable. (Ayako et al., 2015) As shown in Table 7, the resulted value of hausman test is 0.3358 which is greater than 0.05 its means Null (Ho) Hypothesis accepted and (H1) Alternate hypothesis is rejected hence random effect model is best.

Table 7: Hausman Test

Dependent Variable	Independent Variable	Chi2 = (b-B)'[(V_bV_B)^(-1)](b-B)	Prob>Chi2	FEM/REM (Modelling technique)
SM	GP,CP,FX,IN	4.56	0.3358	REM

Note: SM = Stock Market, CP= Crude Oil Price, FX= Rate of foreign exchange, IN = Inflation, FEM = Fixed Effect Model, REM= Random Effect Model

Result of Random Effect Model

Table 8: Result of Random Effect Model

Stock Market	Coef.	Robust Std.Err.	Z	P>|z|
GP	.3761618	.1645908	2.29	0.022
CP	-.2037436	.0716292	-2.84	0.004
FX	.2340084	.1983082	1.18	0.238
IN	-.1207014	.0578123	-2.09	0.037
_cons	2.202149	.7191727	3.06	0.002
No of Obs.	= 140			
R^2	= 0.3089			
Wald chi2 (Prob Value)	= 38.90			

Note: SM = Stock Market, CP= Crude Oil Price, GP = Gold Price, FX= Rate of foreign exchange, IN = Inflation

Robust test was applied because autocorrelation exist in this data. As shown in Table 8, there is significant positive relationship among gold price and stock markets which means this hypothesis is accepted. Secondly significant negative association among the crude oil price and stock markets is detected which indicates that its hypothesis is also accepted. And there is a significant negative relationship among inflation which means its hypothesis is also accepted and stock markets the association among the rate of foreign exchange and stock markets is detected as insignificant therefore, its hypothesis is rejected.

Discussion and Conclusion

The objective of this research study was set to examine the association between the stock market and four macroeconomic indicators which were gold price, crude oil price, the rate of foreign exchange and the inflation. In alignment with the objective, four hypothesis were made to test this relationship taking Stock market performance as a dependent variable and independent variables were the gold price, the crude oil price, the rate of foreign exchange and the inflation. All the four hypothesis were designed for testing significant relationship of their respected independent variable on dependent variable. The deductive approach was used to test the hypothesis through analysis of secondary data. Panel data of fourteen years from 2007 to 2020 of ten Asian countries (Pakistan, India, Malaysia, Thailand, Indonesia, Singapore, Philippine, Srilanka, Vietnam and Kazakhstan) was used this study. The STATA software was used in this analysis. The panel data results, revealed significant positive relationship among gold price and stock markets that indicates change in gold price has brought a significant and positive effect of stock market. This outcome or result supports the

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past study discoveries of Singhal et al. (2019) and Shabbir et al. (2020) and oppose the findings of (Chen & Wang, 2017; Samontaray & Alanuzi, 2015; Tursoy & Faisal, 2018). Secondly significant negative association among the crude oil price and stock markets is detected. Which means change in crude oil price brought a negative and significant effect of stock market. This finding oppose the findings of (Hatemi-J et al., 2017; Phan et al., 2015; Shabbir et al., 2020) and supports the findings of (Najaf, 2016; Raza et al., 2016) And there is a significant negative relationship among inflation and stock markets which means change in inflation brought a negative and significant effect of stock market. This finding supports the outcomes of (Greenwood & Smith, 1997; Nijam et al., 2015) and oppose the results of (Antonakakis et al., 2017; Chang et al., 2019; Norehan & Ridzuan, 2020). The association between the rate of foreign exchange and stock markets is detected as insignificant. That means changes in rate of foreign exchange had no significant influence on stock market. This outcome was contrary to previous studies which were reviewed for the rate of foreign exchange as independent variable for current study.(Bashir et al., 2016; Chang et al., 2019; Jayashankar & Rath, 2017; Naresh et al., 2018; Nijam et al., 2015; Nordin et al., 2020).

Implications

The current study had theoretical and practical implications. From a theoretical perspective, there were mixed outcomes in previous studies. In addition to that past studies on stock market were performed by using different set of independent variables for example (Shabbir et al., 2020; Tursoy & Faisal, 2018) has studied the association of stock market with Gold price and oil price similarly (Al-hajj et al., 2018) employed industrial production, oil price, exchange rate, interest rate and inflation to test their effect on stock market. In a similar way (Chang et al., 2019) have taken industrial production index, interest rate, inflation, exchange rate, trade balance and foreign direct investments as independent variables to analyses their effect on stock market. Therefore, to the best of author's knowledge, this study has used a unique set of independent variable which was not used before. Consequently, this study contributes to fill the existing gap in literature for researchers and students of finance and economics through its extended framework. Along with theoretical contribution, this study was focused on stock market which was the dependent variable. It can be helpful in study of behavior of stock markets in relation to four major macroeconomic variable. This study could be beneficial for prediction of stock market performance. This learning can facilitate government for policy making and formulation of controlling measures which will be fruitful for economic prosperity. On the other hand this study could be beneficial for investors also for developing a better understanding of stock market volatility which can help them in making smart decisions for their investments to maximize their returns and for selection of most secure options.

Conclusion, Limitations and Future Recommendations

On the basis of findings, out of the four hypothesis three were accepted. The relation among the rate of foreign exchange and stock market was not found significant. The relationship among the stock market with gold price, the crude oil price and the inflation were found as significant. The theory applied on the model of the study was arbitrage pricing theory which explains about the effect of macro-economic factors on stock returns. The findings also support this theory because three out of the four selected macroeconomic variable have influenced the stock markets of selected Asian economies. Based on the findings, it is suggested that investors and parties related to stock markets should keep an eye on macroeconomic indicators especially those which were tested in this study namely gold price, the crude oil price and inflation. Since their movement effects the volatility of stock market, the investment decisions can be refined further. Similarly, the government and regulatory authorities can also bring the impact of these variables in consideration while making policy to facilitate stock market. In this study, the stock market was dependent variable while price

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if crude oil, gold price, rate of foreign exchange and inflation were independent variables. The findings have revealed that relationship of crude oil price, gold price and inflation is found significant with stock market, but the relationship of exchange rate has appeared as insignificant. This insignificant exchange inflation with stock market could be tested on a broader data in future. Due limitation of data availability, this study has been conducted on yearly panel data of fourteen years from 2007 to 2020 of ten Asian countries (Pakistan, India, Malaysia, Thailand, Indonesia, Singapore, Philippine, Srilanka, Vietnam and Kazakhstan). In future data from all Asian countries can present further depth in understanding the hidden scenarios. The model of the study could be further extended by such addition of variables which can be tested for their significant impact on stock market.

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